STATE OF CALIFORNIA

DIVISION OF MINES AND GEOLOGY

Fault Evaluation Report FER-5

January 12, 1977

1. Name of fault: San Andreas, Leona Valley segment.

2. Location: Lake Hughes (portion), Del Sur, Sleepy Valley and Ritter Ridge (portion) quadrangles; Los Angeles County (see index map, figure 1).

3. Reason for evaluation: Re-evaluation of zoned faults prompted by release of detailed report and maps (by Kahle, et al. (1975).

4. References:

a) Kahle, J.E., Smith, D.P., and Beeby, D.J., 1975, Geology of the Leona Valley segment of the San Andreas fault zone, Los Angeles County, California: California Division of Mines and Geology, report sponsored by the U.S. Geological Survey in cooperation with the County of Los Angeles, 169 p., 3 pl., 5 appendices.

b) California Division of Mines and Geology, 1974, Official Maps of Special Studies Zones, issued July 1, 1974, Lake Hughes, Del Sur, Sleepy Valley, and Ritter Ridge quadrangles.

c) Jennings, C.W., 1975, Fault map of California with locations of volcanoes, thermal springs and thermal wells: California Division of Mines and Geology, California Geologic Data Map Series, Map no. 1.

5. Summary of available data:

The Leona Valley segment of the San Andreas fault is shown on the attached portions of Special Studies Zones (SSZ) maps identified in

reference (b). These zone maps are compiled from 8 different references (see figure 2). Because the source maps were made by different investigators for different purposes, there is some disagreement regarding the location and recency of faulting. As a result, the SSZ boundaries may not have been located properly -- locally being too narrow, too wide, or asymmetric.

New fault data, reported on by Kahle, et al. (1975), is based on detailed studies conducted over a 3-year period. This new information identifies and evaluates the most recently active faults. The main trace of the San Andreas fault are identified on plates 2A and 2B of Kahle, et al. Other recently active faults also are identified on the plates and are described on p. 120-136. The 1857 traces and other Holocene fault traces of Kahle, et al. are plotted in a generalized way in orange pencil on the attached zone maps (Figure 2). The other faults are considered by Kahle, et al. to be Quaternary (evidence of Pleistocene activity) and are shown in green. A few minor faults and airphoto lineaments have been omitted from Figure 2. For the purpose of this reivew, the Holocene and other faults are plotted on the attached maps somewhat casually. Therefore, any rezoning based on the work of Kahle, et al. should be based on a careful replotting of traces shown on their original maps.

As can be seen from Figure 2, all of the Holocene and historic fault traces of Kahle, et al. lie within the established SSZ with one minor exception (in Section 25 at SE end of Leona Valley). A few Pleistocene faults (shown in green) also lie outside or partly outside the established zones. These include parts of the Powerline, Leona Avenue and Hitchbrook

faults. A short segment of the San Francisquito fault lies totally within the established SSZ.

Kahle, et al. report no evidence of Holocene or Late Quaternary activity along any of the secondary faults outside the main fault zone (main and north branch faults). On p. 135, they state "we can predict accurately where the main fault will move again (but) we can only speculate where secondary faulting is likely to occur."

Jennings (1975), shows the San Andreas fault as active and the other nearby faults in this area as "not known to Quaternary."

6. Interpretation of airphotos: (not considered necessary)

7. Field observations: The main fault and a few secondary faults were observed by me twice since 1973 and I concur with the general observations made by Kahle, et al. Outside of the main and north branches, no compelling evidence of Holocene faulting was apparent along observed portions of the Leona Avenue and Powerline faults.

8. Conclusions: The only conclusion considered here is whether the new maps of Kahle, et al. require that revisions be made of part of the existing Special Studies Zones delineated on the Lake Hughes, Del Sur, Sleepy Valley, and Ritter Ridge quadrangles.

a. The active main and north branch traces of the San Andreas fault lie wholly within the established SSZ. However, the SSZ boundaries could be redrawn to provide a more symmetrical fit along the relocated fault traces. ~~However~~, this amounts to little more than "manicuring" the existing zone and may create new problems (for example, how close should the zone boundaries be placed with respect to the main, well-located San Andreas traces?).

b. The SSZ around the Leona Avenue, Powerline, and San Francisquito (east end) faults also could be modified slightly to fit the new data better, although the faults lie almost entirely within the zone boundaries. Based on the new data, these zones may not have been established under the current policy (of the State Geologist) of zoning only those faults for which there is evidence of Holocene activity.

c. The Hitchbrook and various unnamed faults (mostly minor) lie largely outside the existing SSZ's. There is no substantial evidence that any of these faults have been active during the Holocene.

d. The predictability of movement along secondary faults, mapped or unmapped by Kahle, et al. (p. 135), apparently is speculative as to location and probability of ground rupture.

e. Any rezoning of the Leona Avenue and San Francisquito faults would require a re-evaluation of the fault data initially used to zone the Del Sur and Sleepy Valley quadrangles.

f. Faults other than the main and north branches of the San Andreas apparently show little or no evidence for significant Holocene displacement. The main alternatives to re-zonation of all of these faults are; (1) Rezone the Leona Valley, San Francisquito, and Powerline faults to better fit the Kahle, et al. traces; (2) delete all zones around faults not known to be Holocene. The first would be a minor revision (manicuring) and the second would be a major revision.

9. Recommendations: These recommendations are made with the knowledge that Leona Valley is undergoing low density residential development.

a. Considering the uncertain effects and possible problems of minor rezoning (considered under Conclusions), it is recommended that no rezoning be done unless further evaluations indicate the need to revise the San Francisquito fault and its westerly extension, the Clearwater fault. C.W. Jennings (1975) shows the Clearwater fault to be Quaternary but does not portray the San Francisquito fault as Quaternary. If our evaluation (based on data other than Kahle, et al.) clearly indicates the need to revise or delete the San Francisquito fault zone, then other appropriate changes (based on Kahle, et al.) should also be made on the Sleepy Valley map at the same time.

b. The Lake Hughes map would require such minor changes based on Kahle, et al. that no revisions are recommended at the present.

c. Ritter Ridge and Del Sur maps -- no revisions are recommended based on the present data, which would require only minor changes in the existing zones.

10. Investigating geologist: EARL W. HART
Geologist
January 12, 1977

Earl W. Hart

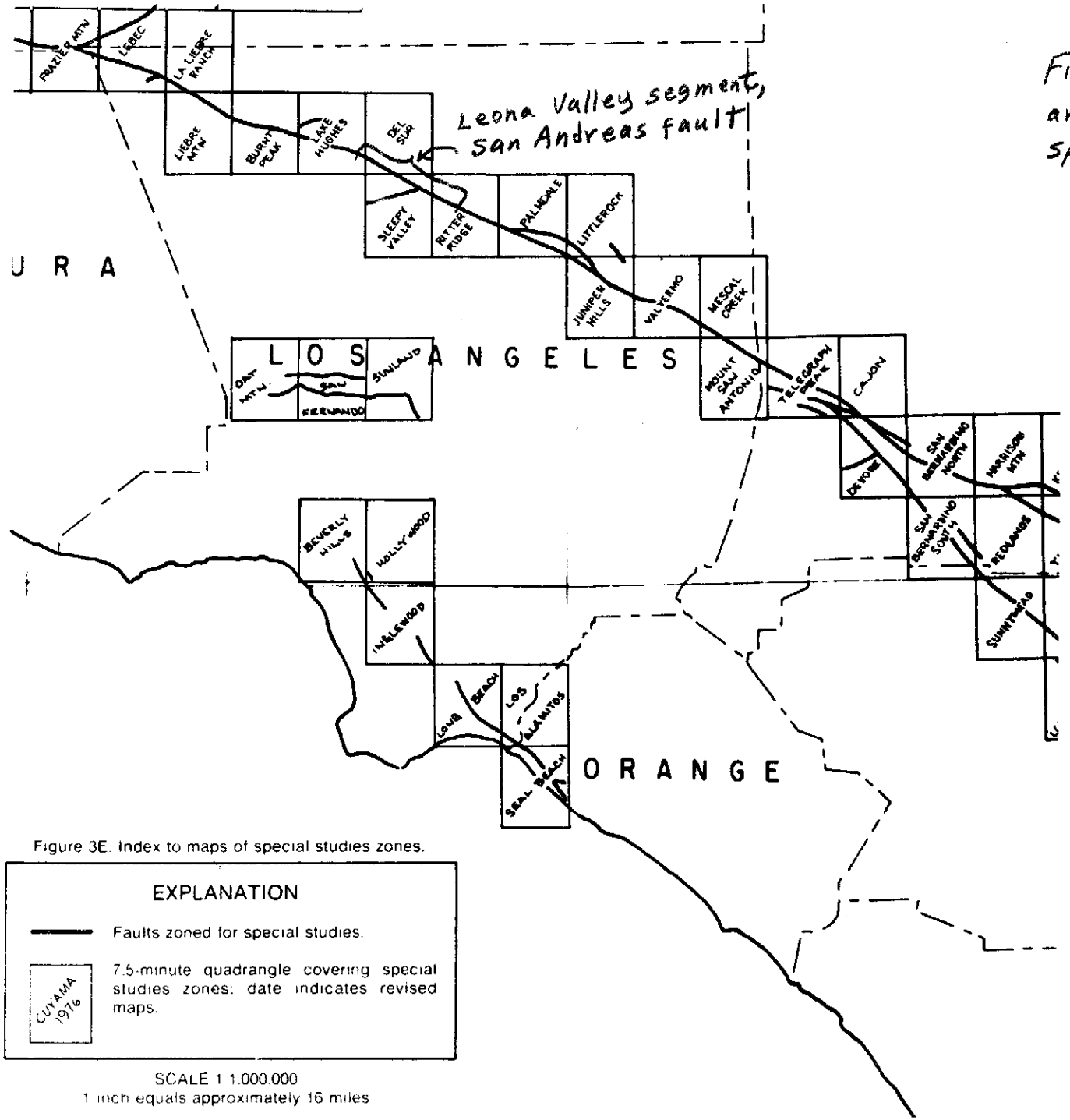

Figure 3E. Index to maps of special studies zones.

EXPLANATION

Faults zoned for special studies.

CUYAMA 1976 — 7.5-minute quadrangle covering special studies zones; date indicates revised maps.

SCALE 1:1,000,000
1 inch equals approximately 16 miles

Fig. 1. Index of Leona Valley area, FER-5 (modified from Spec. Publ. 42).